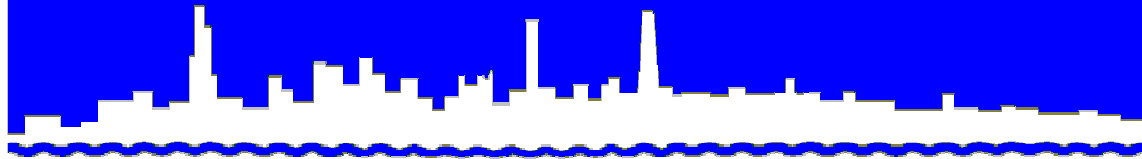


Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

REPORT NO. 10-17

***MICROBIOLOGICAL REPORT OF
BYPASS SAMPLES IN 2009***

March 2010

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MICROBIOLOGICAL REPORT OF
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DISCLAIMER

Mention of proprietary equipment and chemicals in this report does not constitute endorsement by the Metropolitan Water Reclamation District of Greater Chicago.

MICROBIOLOGICAL REPORT OF BYPASS SAMPLES IN 2009

Introduction

The Metropolitan Water Reclamation District of Greater Chicago (District) was created in 1889 to protect the source of the City of Chicago's drinking water supply – Lake Michigan. The District collects and treats wastewater from more than 5 million people and the industrial equivalent of another 4.5 million people in Cook County. All treated effluent from the District's Water Reclamation Plants (WRPs) is discharged to the inland Chicago Area Waterway System (CAWS), tributary to the Des Plaines River which flows into the Illinois River and ultimately to the Mississippi River. The District has continued to safeguard the lake water resource not only through capital improvements such as the Tunnel and Reservoir Plan (TARP), but also through continuing water quality monitoring programs. The District operates TARP to collect and treat sewer overflows and provides storm water management for all of Cook County. TARP provides additional storage for sewage overflow during heavy precipitation that would otherwise discharge into the rivers. The ultimate storage upon completion of TARP will be 17.5 billion gallons. These efforts are crucial to protecting the Lake Michigan water quality while allowing the water in the inland CAWS to be used for recreational and commercial purposes.

Lake Michigan and the inland CAWS are separated by locks at the mouth of the Chicago River and the Calumet River, and by gate structures that control the amount of water withdrawn from the lake, and allow release of excess river water into the lake during relatively severe storm events. When the collection system receives excess flow which cannot be diverted into TARP, the CAWS water elevation rises to flood stage, and it becomes necessary to open the locks and reverse the flow to Lake Michigan. The District controls the water level through its operation of lakefront structures; the Wilmette Pumping Station (WPS); the sluice gates at the Chicago River Controlling Works (CRCW); and the sluice gates at the O'Brien Lock and Dam (OLD). The District conducts its operations to ensure that release of excess floodwaters into the lake is a last resort, when all the District WRPs are operating at their maximum capacity and the waterways are approaching or exceeding flood stage. During the lake diversion events, the District conducts water quality monitoring to assess the effects of bypassing storm flows from the CAWS to the lake.

This report describes the results of microbiological analyses of collected samples during bypass events to Lake Michigan as a result of exceptionally large volumes of rainfall in 2009.

Microbiological Results of Bypass Samples in 2009

From January 1 through December 31, 2009, there were three rainstorm events severe enough to require reversals of the North Shore Channel (NSC) to Lake Michigan at Wilmette Harbor. There were no reversals from the Chicago River, the 95th and/or 122nd Street Pumping Station; no discharge of combined sewer overflows (CSOs) to Howard Slip and/or the Calumet River; and none from the Calumet River to Lake Michigan at the OLD.

The fecal indicator bacteria (FIB), *E. coli* (EC), was analyzed in compliance with the bypass flow to Lake Michigan related monitoring requirement. The backflow to Lake Michigan sampling locations are shown in [Figure 1](#). Samples collected in NSC, Wilmette Harbor and Lake Michigan beaches were analyzed for *E. coli* using the Quanti-Tray/2000 (IDEXX Laboratories, Inc., Westbrook, ME). The relevant information about the discharges and the microbiological sampling results are described below.

Wilmette Harbor. The first rainstorm event occurred on Thursday, February 26, 2009. An exceptionally large volume of rain fell Thursday night in the Chicago area, with the downpour causing closure of flooded roads and rising river levels. The city's official rain tally at O'Hare International Airport had reached 1.9 inches by 9:00 p.m. At one point, the storm dropped up to an inch of rain per hour, according to the National Weather Service and WGN-TV meteorologist Tom Skilling (WGN 9 News, 2009)¹.

The District rain gauge data record as of midnight of February 26, 2009 is shown in [Table 1](#). The District rain gauge data for February 26, 2009 indicated average precipitation in the amount of 1.9 inches at the north basin area, and localized rainfall up to 2.11 inches at the North Side WRP. In north suburban Wilmette, over 2.0 inches of rain was measured. Due to significant late-evening rainfall amounts, the collection system and the North Side WRP were receiving maximum practical flow. As a result, between 9:30 p.m. (2130 hours) and 11:59 p.m. (2359 hours), at WPS of the NSC at Wilmette Harbor, a diversion was made to Lake Michigan. The diversion continued for 2 hours and 29 minutes, discharging 78.9 million gallons from the waterway to Lake Michigan. Shortly after the discharge from WPS, water samples were collected for FIB analyses, continuing at approximately 30-minute intervals. Three samples were collected during the discharge on February 26, 2009. Six water samples were collected on February 27, 2009. The EC results are shown in [Table 2](#).

The second rainstorm event began the afternoon of Sunday, March 8, 2009. The Chicago area was hard-hit by heavy rains and a flood warning for northern Illinois and northwest Indiana was extended through 10:00 a.m. Monday, March 9, 2009. The District rain gauge data record as of midnight on March 8, 2009 is shown in [Table 3](#). An average precipitation in the amount of 1.52 inches at the north basin area, and localized rainfall up to 1.5 inches at the North Side WRP were measured. As a result, between 2:31 p.m. (1431 hours) and 10:27 p.m. (2227 hours) at WPS, a diversion was made to Lake Michigan. The diversion continued for 7 hours and 56 minutes, discharging 143.1 million gallons from the waterway to Lake Michigan. During and after the discharges on March 8, 2009, twelve water samples were collected at approximately 30-minute intervals. The EC results are shown in [Table 4](#).

The third rainstorm event began in the late morning of Friday, June 19, 2009. The heavy rainfall was more than twice the prior record rainfall for that date, according to the National Weather Service. The District rain gauge data record as of midnight of June 19, 2009 is shown in [Table 5](#). The heaviest precipitation of the storm event fell in the north basin area, with the average precipitation in the amount of 3.3 inches, and localized rainfall nearly 3.5 inches at

¹ <http://www.chicagobreakingnews.com/2009/02/heavy-rain-fog-and-snow-in-forecast.html>

North Side WRP. As a result, a diversion was made to Lake Michigan from WPS beginning at 11:30 a.m. (1130 hours) on Friday, June 19, 2009. This discharge from the NSC to Lake Michigan continued for 17 hours and 18 minutes, ending at 4:50 a.m. (0450 hours) the morning of Saturday, June 20, 2009. This incident caused the release of 191.6 million gallons of storm and CSO water to Lake Michigan. A total of twelve water samples were collected from the Wilmette Harbor sampling location on June 19, 2009. Additional fourteen water samples from the Wilmette Harbor and the Lake Michigan beaches were collected on June 20, 2009. The EC results are shown in Tables 6 and 7.

Chicago River Controlling Works. During the three record rainstorm events in 2009, the CRCW Gate near Navy Pier was not opened; therefore, there was no bypass flow to Lake Michigan from the CRCW outfall location.

DuSable Harbor. There was no backflow to Lake Michigan from the river side of DuSable Harbor Sluice Gates.

Calumet Area Pumping Station. The O'Brien Gate located near 130th & Torrence Avenue was not opened during these rain events in 2009. Therefore, there was no reverse flow from the Calumet River to Lake Michigan.

FIGURE 1: SAMPLING LOCATIONS FOLLOWING BYPASS TO LAKE MICHIGAN AT WILMETTE

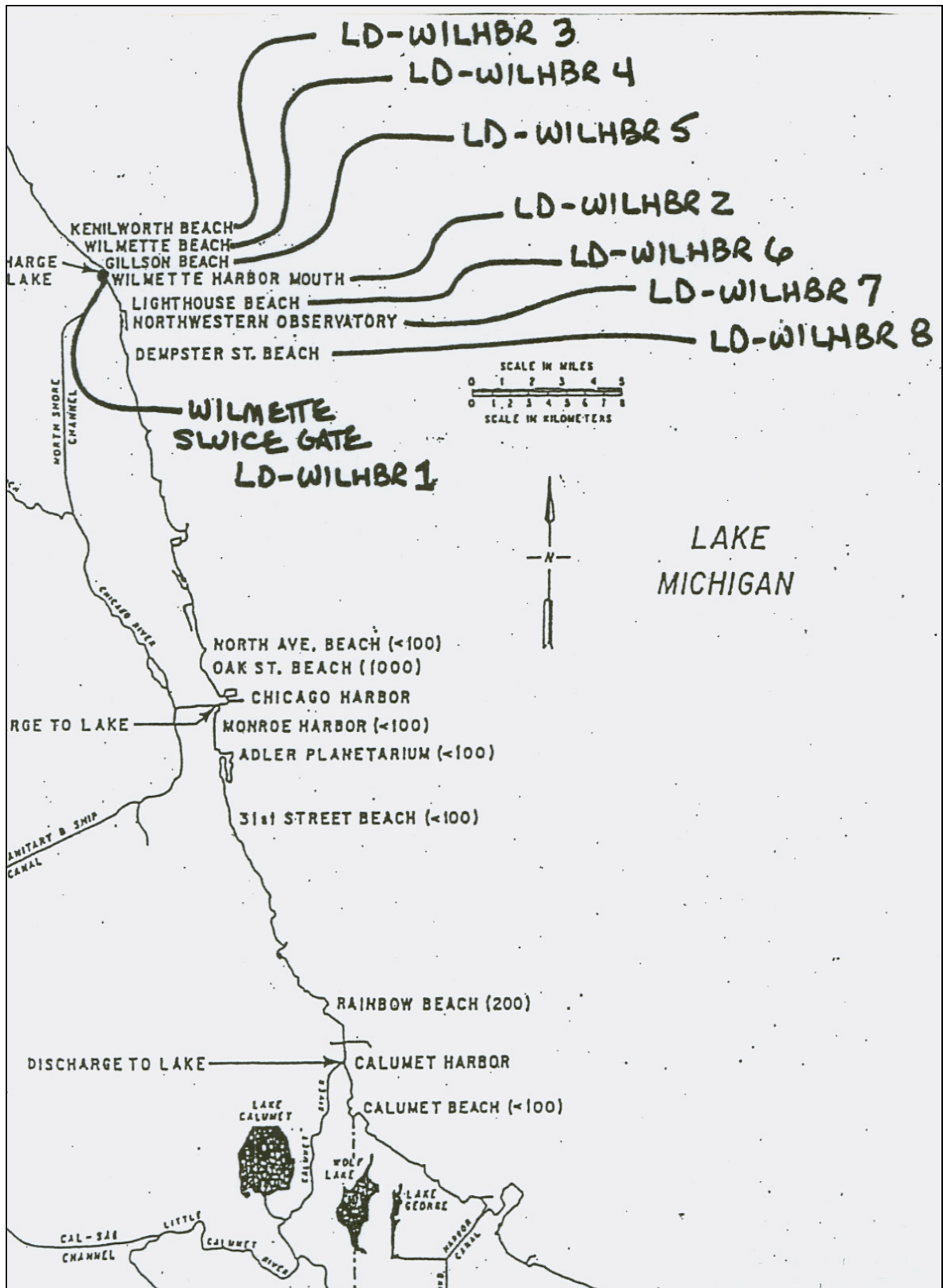


TABLE 1: DISTRICT RAIN GAUGE DATA FOR FEBRUARY 26, 2009¹

Gauge Number	Precipitation (Inches)	Gauge Name	Address
1	1.55	Glenview	1333 Shermer Road, Glenview
2	2.11	North Side WRP	3500 Howard Street, Skokie
3	Out ²	North Branch Pumping Station	4840 N. Francisco Ave, Chicago
4	2.04	Wilmette	613 Sheridan Road, Wilmette
Average	1.90	North Basin Average	
5	Out	West Side	6001 W. Pershing Road, Cicero
6	2.38	Springfield	1747 N. Springfield Ave, Chicago
7	1.49	Racine Ave. Pumping Station	3838 S. Racine, Chicago
8	1.95	MOB	100 E. Erie Street, Chicago
Average	1.94	Central Basin Average	
9	1.71	Melvina Ditch	8644 S. Natchez Ave., Burbank
10	Out	87 th & Western Pumping Station	87 th St. & Western Ave., Chicago
11	Out	95 th Street Pumping Station	9525 S. Baltimore, Chicago
12	Out	Calumet WRP	400 E. 130 th Street, Chicago
Average	1.71	South Basin Average	

¹Source: District website (<http://apps.mwr.org/cso/displayrain.aspx?passdate=2/26/2009>)

²Out = out of service.

TABLE 2: WILMETTE HARBOR¹ BYPASS MONITORING BACTERIA RESULTS
FEBRUARY 26-27, 2009

LIMS Number	Sample Date	Sample Time ²	<i>E coli</i> ³ MPN/100mL
5673617	2/26/09	22:35	9,210
5673619	2/26/09	23:05	48,800
5673620	2/26/09	23:35	92,100
5673621	2/27/09	00:05	77,000
5673622	2/27/09	00:35	61,300
5673623	2/27/09	01:05	51,700
5673624	2/27/09	01:35	86,600
5673625	2/27/09	02:05	64,900
5673626	2/27/09	02:30	54,800

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¹Sample Description/Sample Point - Wilmette Sluice Gate (WILHBR1).

²Military Time.

³*Escherichia coli*: Standard Methods for the Examination of Water & Wastewater, 18th Edition, 1992, Most Probable Number (MPN) Method 9223B (Quanti-Tray/2000).

TABLE 3: DISTRICT RAIN GAUGE DATA FOR MARCH 8, 2009¹

Gauge Number	Precipitation (Inches)	Gauge Name	Address
1	1.55	Glenview	1333 Shermer Road, Glenview
2	1.50	North Side WRP	3500 Howard Street, Skokie
3	Out ²	North Branch Pumping Station	4840 N. Francisco Ave, Chicago
4	1.51	Wilmette	613 Sheridan Road, Wilmette
Average	1.52	North Basin Average	
5	Out	West Side	6001 W. Pershing Road, Cicero
6	1.91	Springfield	1747 N. Springfield Ave, Chicago
7	1.85	Racine Ave. Pumping Station	3838 S. Racine, Chicago
8	1.37	MOB	100 E. Erie Street, Chicago
Average	1.71	Central Basin Average	
9	1.97	Melvina Ditch	8644 S. Natchez Ave., Burbank
10	1.94	87 th & Western Pumping Station	87 th St. & Western Ave., Chicago
11	1.33	95 th Street Pumping Station	9525 S. Baltimore, Chicago
12	Out	Calumet WRP	400 E. 130 th Street, Chicago
Average	1.75	South Basin Average	

¹Source: District website (<http://apps.mwr.org/cso/displayrain.aspx?passdate=03/08/2009>)

²Out = out of service

TABLE 4: WILMETTE HARBOR¹ BYPASS MONITORING BACTERIA RESULTS
MARCH 8, 2009

LIMS Number	Sample Date	Sample Time ²	<i>E. coli</i> ³ MPN/100mL
5681540	3/8/09	14:35	61,300
5681541	3/8/09	15:05	48,800
5681542	3/8/09	15:35	24,200
5681543	3/8/09	16:05	92,100
5681544	3/8/09	16:35	86,600
5681545	3/8/09	17:05	141,000
5681546	3/8/09	17:35	130,000
5681547	3/8/09	18:05	155,000
5681548	3/8/09	18:35	120,000
5681549	3/8/09	19:05	242,000
5681550	3/8/09	19:35	242,000
5681551	3/8/09	20:05	112,000

¹Sample Description/Sample Point - Wilmette Sluice Gate(WILHBR1) .

²Military Time.

³*Escherichia coli*: Standard Methods for the Examination of Water & Wastewater, 18th Edition, 1992, Most Probable Number (MPN) Method 9223B (Quanti-Tray/2000).

TABLE 5: DISTRICT RAIN GAUGE DATA FOR JUNE 19, 2009¹

Gauge Number	Precipitation (Inches)	Gauge Name	Address
1	3.12	Glenview	1333 Shermer Road, Glenview
2	3.49	North Side WRP	3500 Howard Street, Skokie
3	Out ²	North Branch Pumping Station	4840 N. Francisco Ave, Chicago
4	Out	Wilmette	613 Sheridan Road, Wilmette
Average	3.30	North Basin Average	
5	0.46	West Side	6001 W. Pershing Road, Cicero
6	2.62	Springfield	1747 N. Springfield Ave, Chicago
7	1.35	Racine Ave. Pumping Station	3838 S. Racine, Chicago
8	2.28	MOB	100 E. Erie Street, Chicago
Average	1.68	Central Basin Average	
9	0.72	Melvina Ditch	8644 S. Natchez Ave., Burbank
10	0.90	87 th & Western Pumping Station	87 th St. & Western Ave., Chicago
11	0.38	95 th Street Pumping Station	9525 S. Baltimore, Chicago
12	0.89	Calumet WRP	400 E. 130 th Street, Chicago
Average	0.72	South Basin Average	

¹Source: District website (<http://apps.mwrd.org/cso/displayrain.aspx?passdate=06/19/2009>)

²Out = out of service

TABLE 6: WILMETTE HARBOR¹ BYPASS MONITORING BACTERIA RESULTS
 JUNE 19, 2009

LIMS Number	Sample Date	Sample Time ²	<i>E. coli</i> ³ MPN/100mL
5767102	6/19/09	11:30	199,000
5767103	6/19/09	12:00	105,000
5767104	6/19/09	12:30	120,000
5767107	6/19/09	13:00	173,000
5767109	6/19/09	13:30	155,000
5767110	6/19/09	14:00	155,000
5767111	6/19/09	14:30	173,000
5767112	6/19/09	15:00	173,000
5767113	6/19/09	15:30	980,000
5767114	6/19/09	16:00	199,000
5767115	6/19/09	16:30	155,000
5767116	6/19/09	17:00	141,000

¹Sample Description/Sample Point - Wilmette Sluice Gate(WILHBR1) .

²Military Time.

³*Escherichia coli*: Standard Methods for the Examination of Water & Wastewater, 18th Edition, 1992, Most Probable Number (MPN) Method 9223B (Quanti-Tray/2000).

TABLE 7: WILMETTE HARBOR¹ BYPASS MONITORING BACTERIA RESULTS
FROM WILMETTE HARBOR MOUTH AND SEVEN LAKE MICHIGAN BEACHES
JUNE 20, 2009

LIMS Number	Sample Date	Sample Time ²	Sample Description/Sample Point	<i>E. coli</i> ³ MPN/100mL
5769909	6/20/09	07:35	Wilmette Harbor Mouth/WILHBR2	30
5769922	6/20/09	15:40	Wilmette Harbor Mouth/WILHBR2	<10 ⁴
5769913	6/20/09	08:00	Kenilworth Beach/WILHBR3	<10
5769931	6/20/09	16:10	Kenilworth Beach/WILHBR3	<10
5769911	6/20/09	07:50	Wilmette Beach/WILHBR4	<10
5769929	6/20/09	15:55	Wilmette Beach/WILHBR4	<10
5769910	6/20/09	07:40	Gillson Beach/WILHBR5	<10
5769928	6/20/09	15:45	Gillson Beach/WILHBR5	<10
5769908	6/20/09	07:20	Lighthouse Beach/WILHBR6	13,000
5769921	6/20/09	15:25	Lighthouse Beach/WILHBR6	20
5769907	6/20/09	07:15	Northwestern Observatory/WILHBR7	7,700
5769920	6/20/09	15:15	Northwestern Observatory/WILHBR7	<10
5769906	6/20/09	07:00	Dempster Street Beach/WILHBR8	<10
5769919	6/20/09	15:00	Dempster Street Beach/WILHBR8	<10

¹Sample Description/Sample Point - Wilmette Sluice Gate (WILHBR1).

²Military Time.

³*Escherichia coli*: Standard Methods for the Examination of Water & Wastewater, 18th Edition, 1992, Most Probable Number (MPN) Method 9223B (Quanti-Tray/2000).

⁴Less than 10 MPN/100 mL.